CLAIMS

What is claimed is:

1. An apparatus to adjust a head gap in an inkjet printer having a carrier provided with a printer head which includes nozzles to jet ink, a chassis provided with side frames to support a carrier shaft and a guide rail to guide movements of the carrier, a carrier driving unit to move the carrier left and right along the carrier shaft, and a paper supply roller driving unit to drive a paper supply roller which supplies sheets of paper to be printed on, the apparatus comprising:

a carrier ascent/descent unit to rotate the carrier shaft with respect to the carrier to ascend and descend the carrier in order to adjust a head gap between the nozzles of the printer head and a respective sheet of paper;

a clutch unit to transfer a driving force of the paper supply roller driving unit to the carrier ascent/descent unit by the carrier which moves by the carrier driving unit upon the adjustment of the head gap; and

a control unit to store an adjusted head gap state and to adjust a head gap position required based on the stored adjusted head gap state.

2. The apparatus as claimed in claim 1, wherein the clutch unit comprises:

a clutch part to transfer or cut off the driving force of the paper supply roller driving unit to or from the carrier shaft; and

an operation part to operate the clutch part to transfer the driving force of the paper supply roller driving unit to the carrier shaft.

3. The apparatus as claimed in claim 2, wherein the clutch part comprises:

an eccentric rotation gear fixed to one end of the carrier shaft; and

a clutch disposed on the chassis to connect or disconnect the paper supply roller driving unit and the eccentric rotation gear.

4. The apparatus as claimed in claim 3, wherein the carrier ascent/descent unit comprises:

both ends of the carrier shaft which form eccentric cams having a center axis eccentric

by a certain amount with respect to a center axis of the carrier shaft; and

support bushings to support the both ends of the carrier shaft.

5. The apparatus as claimed in claim 4, wherein the clutch comprises:

a rotation shaft fixed to one of the side frames;

a first clutch gear having a toothed portion supported to rotate on the rotation shaft and meshed with the paper supply roller driving unit;

a second clutch gear having a toothed portion supported to rotate on the rotation shaft and coaxially connected with the first clutch gear, the second clutch gear being disposed to move between a power transfer position at which the first clutch gear and the eccentric rotation gear are coupled and a power cutoff position at which the first clutch gear and the eccentric rotation gear are released; and

an elastic spring supported by the rotation shaft between the first clutch gear and the second clutch gear, to elastically press the second clutch gear so that the second clutch gear is located at the power cutoff position.

6. The apparatus as claimed in claim 5, wherein the operation part comprises:

a plate-shaped member slidably disposed in the chassis to push the second clutch gear to the power transfer position when the operation part is pushed by the carrier.

7. The apparatus as claimed in claim 6, wherein the operation part comprises:

a damping portion to absorb shocks excessively transferred to the clutch when the operation part is pushed by the carrier.

8. The apparatus as claimed in claim 7, wherein the control unit comprises:

a non-volatile memory to store the adjusted head gap state, the non-volatile memory being selected from a group consisting of NVRAM, EEPRAM, and flash memories.

9. The apparatus as claimed in claim 8, further comprising:

a stopper member to restrict the eccentric rotation gear to rotate between the power transfer and power cutoff positions.

10. The apparatus as claimed in claim 9, wherein the stopper member comprises:

a protrusion to protrude toward the eccentric rotation gear from the chassis; and

two traverse walls provided in a groove of the eccentric rotation gear to be coupled with the protrusion, blocking rotations of the eccentric rotation gear.

11. The apparatus as claimed in claim 4, wherein the carrier shaft is rotated via the eccentric rotation gear, and at least one end of the both ends is fixed to the eccentric rotation gear.

12. The apparatus as claimed in claim 11, wherein the both ends of the carrier shaft having the center axis eccentric with respect to a center axis of the carrier shaft, rotate in the support bushings via the clutch part and the eccentric rotation gear, allowing the carrier shaft to rotate about the center axis of the both ends.

13. The apparatus as claimed in claim 12, further comprising:

a guide slider on the carrier to guide along the guide rail, so that the nozzles of the printer head mounted in the carrier are guided to horizontally ascend without being slanted forward or backward.

14. The apparatus as claimed in claim 5, wherein the eccentric rotation gear comprises a partial gear to mesh with the second clutch gear.

15. The apparatus as claimed in claim 4, wherein the clutch comprises:

a rotation shaft fixed to one of the side frames;

a first clutch gear having a toothed portion supported to rotate on the rotation shaft and meshed with the paper supply roller driving unit;

a second clutch gear having a toothed portion supported to rotate on the rotation shaft and coaxially connected with the first clutch gear, the second clutch gear being disposed to move between a power transfer position at which the first clutch gear and the eccentric rotation gear are coupled and a power cutoff position at which the first clutch gear and the eccentric rotation gear are released; and

an elastic spring supported by the rotation shaft via the first clutch gear, to elastically press the second clutch gear so that the second clutch gear is located at the power cutoff position.

16. The apparatus as claimed in claim 7, wherein the operation part further comprises:

an operation protrusion part provided adjacent to the carrier;

a collision contact portion to contact with the operation protrusion;

a movement slide slidably disposed on the chassis; and

a operation bar to transfer a collision force of the operation protrusion to the second clutch gear.

17. The apparatus as claimed in claim 16, wherein the damping portion comprises a U-shaped coupler to elastically connect the movement slide and the operation bar.

18. The apparatus as claimed in claim 10, wherein the traverse walls are formed in an angle of about 180° to each other to correspond to positions at which the carrier ascends and descends, so that the traverse walls are coupled with the protrusion of the stopper member to block the rotations of the eccentric rotation gear.

19. The apparatus as claimed in claim 12, wherein the carrier ascends and descends by a distance allowed for the center axis of the carrier shaft to vertically move.

20. A method of adjusting a head gap in an inkjet printer comprising:

receiving a head gap adjustment command from a control unit;

reading out a head gap state stored in a non-volatile memory of the control unit;

comparing a head gap position to be adjusted according to the received head gap adjustment command to the head gap state read out from the non-volatile memory;

adjusting the head gap position when the head gap position to be adjusted does not match the read-out head gap state as a result of the comparison; and

storing an adjusted head gap state and waiting for printing.

21. The method as claimed in claim 20, wherein the adjusting the head gap position comprises:

controlling a carrier driving unit to drive a carrier to be moved toward the head gap adjustment position along a carrier shaft; and

controlling a paper supply roller driving unit to generate a driving force when the carrier is disposed at the head gap adjustment position in order for the carrier shaft to move with respect to a paper path.

22. The method as claimed in claim 21, wherein the controlling the paper supply roller driving unit comprises:

selectively transferring the driving force to the carrier shaft in response to the movements of the carrier; and

terminating the transfer of the driving force to the carrier shaft in response to the movements of the carrier outside the head gap adjustment position from the head gap adjustment position.

23. The method as claimed in claim 20, wherein the adjusting the head gap position comprises:

automatically adjusting the head gap in response to the driving force of the carrier driving unit and the paper supply roller driving unit without using an extra driving motor.

24. The method as claimed in claim 20, further comprising:

initializing the head gap.

25. The method as claimed in claim 24, wherein the initializing the head gap comprises:

storing an arbitrary head gap position in the non-volatile memory upon manufacturing of the printer;

reading out the head gap state stored in the non-volatile memory;

setting a head gap state flag corresponding to the read-out head gap state; and

initializing a mechanism for the head gap.

26. The method as claimed in claim 20, wherein the head gap adjustment command is received by one of a head gap adjustment and paper selection button on a control panel of the control unit.

27. An apparatus to adjust a head gap in an inkjet printer, comprising:

a carrier provided with a printer head which includes nozzles to jet ink;

a chassis provided with side frames to support a carrier shaft and a guide rail to guide movements of the carrier;

a carrier driving unit to move the carrier left and right along the carrier shaft; and

a paper supply roller driving unit to drive a paper supply roller which supplies sheets of paper to be printed on, wherein,

the head gap is adjusted by using driving forces of the carrier driving unit and the paper supply roller driving unit without using an additional driving unit.

28. An apparatus to adjust a head gap in an inkjet printer having a carrier provided with a printer head which includes nozzles to jet ink, a chassis provided with side frames to support a carrier shaft and a guide rail to guide movements of the carrier, a carrier driving unit to move the carrier left and right along the carrier shaft, and a paper supply roller driving unit to drive a paper supply roller which supplies sheets of paper to be printed on, the apparatus comprising:

a carrier ascent/descent unit to rotate the carrier shaft with respect to the carrier to ascend and descend the carrier in order to adjust a head gap between the nozzles of the printer head and a respective sheet of paper;

a clutch unit to transfer a driving force of the paper supply roller driving unit to the carrier ascent/descent unit by the carrier which moves by the carrier driving unit upon the adjustment of the head gap; and

a control unit to store an adjusted head gap state and having a nonvolatile memory to adjust a head gap position required based on the stored adjusted head gap state, wherein,

the nonvolatile memory is used rather than an additional head gap sensor to adjust the head gap position.